Original Article

Community Acceptance of Available Milk and Assessment of Its Quality in Peri-Urban Area of Southwest Delhi

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Abstract

Background: Milk is considered to be a balanced food rich in fats, proteins, vitamins, and minerals, which is complete nutrition in a balanced proportion. However, most of milk sold in India does not match standards laid down by the Food Safety and Standards Authority of India. **Objective:** The objective was to understand the perception of community regarding the acceptance of packaged and unpackaged milk, to assess the quality of milk with respect to adulterants, and to assess the difference in the quality of milk at a level of vendor/hawker and end user. **Materials and Methods:** A cross-sectional study was conducted among 100 households in the peri-urban area of Kangan Heri, Delhi. A structured questionnaire and checklist were used for data collection. Purposive sampling was used. The analysis was done with the Statistical Package for the Social Sciences version 22. Descriptive statistics and cross tabulation were used. **Results:** A total of 22.5% respondents preferred packaged milk over unpackaged milk. Only 8% of packaged milk samples contained no adulterant. Majority of the respondents were preferred unpacked milk for daily consumption. **Conclusion:** Community perceives good taste as traits of good quality milk followed by good smell, digestibility, and color and economical. The presence of neutralizer in packaged milk followed by detergent and urea. There was no difference in the presence of adulterants in packaged milk at the level of end user or vendor. There is a slight difference in the presence of adulterants in unpackaged milk at level of end user.

Keywords: Adulterant, detergent, FSSAI, packaged milk, quality milk, urea in milk and neutralizer

Introduction

Milk is considered to be a balanced food rich in fats, proteins, vitamins, and minerals, as it provides complete nutrition in a balanced proportion. The most common animals from which milk is derived include cows, buffalos, goats, and sheep. The various types of packaged milk include full cream, skimmed, toned, double toned, etc., depending on the fat content of the milk available in the market. The common brands of milk in India include Mother Dairy, Amul, Gopalji, Nandi Milk, etc.

According to a report by the *Indian Express*, almost 70% of milk sold in India is "adulterated," as it does not match the standards laid down by the Food Safety and Standards Authority of India (FSSAI). Adulterants are the contaminants that degrade the quality of milk and are harmful to human health.

Adulteration of milk is an important issue being addressed by the FSSAI. Some of the common adulterants such as water, starch, urea, glucose/invert sugar, etc., can be tested at home. Other adulterants that require sophisticated instrumentation have to be sent to a food testing laboratory for evaluation.

People have hybrid cattle, and the quality of milk is changing naturally. Hybrid cattle and environmental changes have rendered the old standards useless. Fat and solid nonfat (SNF) standards differ across states. In Punjab, Chandigarh, and Haryana, for example, the percentage of recommended fat is 4%, 3% for Mizoram and Odisha and 3.5% for the rest of India. For SNF, earlier criteria were 8.2% (*Hindustan Times* report).

Adulteration or adding unwanted ingredients to foods may be intentional or unintentional. The first is done deliberately to increase profits. Adulteration may also be incidental due to a lack of knowledge and lack of hygiene. To avoid

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getting caught, the adulterators add certain substances to the "watered" milk to improve its thickness, taste, density, and viscosity. The common adulterants are formalin, urea, starch, neutralizers ($NaHCO_3$, Na_2CO_3, NaOH, Ca (OH) $_2$, etc.) detergents, sodium chloride, skim milk powder, sucrose, glucose/dextrose, and hydrogen peroxide. Some of these are referred to SNF and are used to cover the quantity of natural fats missing in the "watered" milk.

The objectives of this article are to understand the perception of community regarding acceptance of packaged and unpackaged milk, to assess the quality of milk with respect to adulterants, and to assess the difference in the quality of milk at level of vendor/hawker and end user.

Materials and Methods

To achieve the objectives, a quantitative method was used for data collection and analysis. The study was included literature review, brainstorming discussions on study objectives, area selection, methodology, and pilot test.

Study area and subjects

This study was carried out in the peri-urban area of Kangan Heri in Southwest Delhi having approximately 900 houses and since most of the households had live stocks, this area was selected. The target population consists of the female population from different age groups, education levels, and diverse experiences. They carry out the daily household activities and decides on what grocery items should be bought to house for daily consumption.

Sampling method

Purposive sampling method was used for collecting the data. A semi-structured questionnaire was used. The questionnaire contained questions pertaining to sociodemographic factors, perceived quality, and preference of available milk. The questionnaire was originally made in English. The questionnaire was pretested and then finalized after incorporating suggestions from the respondents. A sample size of 100 was chosen according to the available resource and time.

The milk samples were collected from 100 households. The milk samples collected from the households were put in sterile containers. The collected milk samples were tested for the quality with respect to each below-mentioned adulterants (the list of adulterants that were tested is mentioned in the milk testing kit section below) using the milk testing kit. This helped in assessing the quality of packaged and unpackaged milk.

The packaged milk samples were bought from the local market of the study area. These samples were tested for the quality with respect to the adulterants using the milk testing kit. This helped in comparing the quality of packaged milk at the level of local market/vendor and at the level of the end user (households).

The unpackaged milk samples were bought from the hawkers supplying milk in the study area. These samples were tested for quality with respect to the adulterants using the milk testing kit. This helped in comparing the quality of unpackaged milk at the level of hawker and at the level of the end user.

Under each brand of packaged milk, there are subcategories such as toned, double toned, and full cream. Regardless of the number of samples of brands of packaged milk collected from the household, a packet of packaged milk was bought from the local market. For example, ten samples of milk collected from the household under the brand name of "mother dairy" and subcategory "full cream," only one packet of mother dairy full cream was bought from the local market. Therefore, depending on the brand and its type, the sample size was varied.

Milk testing kit

An innovative technology was used by the Defence Food and Research Laboratory to test the quality of milk. The milk testing kit is called "test of milk kit." This test kit gives immediate results within 5 min. The test strips can detect an adulteration level at not <0.5%. It helps in detecting the presence of added adulterants. Any change in the color of the strip implied the presence of adulterant. Each milk testing kit contains 80 testing strips (ten strips for each adulterant). Following adulterants were tested – urea, starch, hydrogen peroxide, boric acid, neutralizers, and detergents/pulverized soap.

Pilot test

Pilot testing was done on eight households using the questionnaire to test the response rate of the study population in the study area and also to test the effectiveness of the questionnaire in assessing the perceived quality, preference, and quality of packaged and unpackaged milk. In pilot testing, the socioeconomic scale according to the Kuppuswamy and the standard of the living index were used to test, which of these two are more effective. Kuppuswamy's socioeconomic scale was finally accepted.

Data analysis

The collected data were coded and analyzed with the help of IBM SPSS Statistics for windows, version 24 (IBM Corp, Armonk, NY, USA) software. Descriptive statistics and cross tabulation were mainly used on data. The socioeconomic status of the respondents was calculated using Kuppuswamy's Socio-economic scale, which contained three questions, that is, education of the head, occupation of the head, and family's monthly income. After calculating the score, the socioeconomic status of the respondent was decided as upper class, upper middle, lower middle, upper lower, and lower class.

Ethical considerations

The study was reviewed and approved by the ethics committee of the International Institute of Health Management Research, Delhi. Confidentiality and importance of the responses were conveyed to the participants. Potential participants were informed that the study was designed to know the availability of quality milk. Each brand name of milk was coded to maintain confidentiality. Informed consent was obtained from all participants before participation. Participants were informed

that they could voluntarily accept or refuse to participate in the study at any stage; also it was assured that the collection of the data was for research purposes only.

Results

Demographic characteristics

All the respondents in the sample were females, married, and homemakers. The response rate in the sample was 89/100 (89%). According to the Kuppuswamy score for socioeconomic status, most of the respondents 46% belonged to the upper middle class, followed by lower middle class (30%), lower upper middle class (10%), and upper class (3%).

Preference of the type of milk

Of 89 respondents who accepted to participate in the study, 51 preferred packaged milk over unpackaged milk. Remaining 38 preferred unpackaged milk. Majority of the respondents were preferred packaged milk because of easy accessibility (67%), its good taste (47%), and hygienic value (24%) followed by thick consistency (18%), easily digestible (6%), good smell (4%), and economically cheap (4%). Those who preferred unpackaged milk, most of the households liked due to its good taste (21%), easy accessibility (11%), hygienic value (11%), thick consistency (11%), easily digestible (5%), good smell (8%), and economically cheap (4%).

Brand of packaged milk

Of 51 respondents who preferred packaged milk, 32 respondents used "Brand A," nine used "Brand B," and ten respondents used "Brand C." All three brands have been coded for ethical reasons.

Presence of adulterants

Major adulterants present in packaged milk at the level of end user were urea (71%) and neutralizer (64%) followed by detergent/pulverized soap (29%). Only 8% of the samples contained no added adulterant. Adulterants were present in packaged milk bought from the local market are urea, neutralizer, and detergent/pulverized soap. There was no difference in the presence of adulterants in packaged milk at the level of end users and local market.

Sources of unpackaged milk

There were two major sources of unpackaged milk. First, respondents (63%) who own cattle did not buy milk from other sources. Second, respondents who bought unpackaged milk (37%) from hawkers.

Reasons for using unpackaged milk from hawkers

Majority of the respondents preferred unpackaged milk because of its good taste, accessibility, thick consistency, and hygienic value, followed by good smell and easily digestible.

Attributes of a good quality milk

Of 89 respondents, 82 respondents responded regarding attributes of good quality of milk. Respondents perceived good-quality milk to possess traits such as good taste (58%), thickness in consistency (30%), and good smell (28%) followed by pearly white color (11%), easily digestible (20%), and economically cheap (1%).

Discussion

Consumer's perception plays an important role in influencing the purchase of any particular product. It is basically an opinion-forming process based on certain product attributes that a consumer attaches priority in product selection. Consumers now demand products that are safe to consume and are produced and distributed through transparent procedures. The mean attribute score of consumers for the overall food safety subset comprising of various safety attributes of packed milk was 3.27 on the scale. This implied that consumers had a low level of agreement with the statements that packaged milk was safe to consume. This is mainly due to the lack of awareness of food safety parameters. Socioeconomic characteristics of the respondents are considered very important in consumer studies. These characteristics provide useful background information for in-depth understanding of the behavior of consumers. According to a study in Pakistan, results show that education and income of the respondents do not have a significant effect on consumer behavior. The consumers had a liking for packed milk regardless of their education and income. The results clearly imply that fairly younger, married, and male consumers irrespective of income and education level prefer to purchase packed milk due to its relatively better quality attributes with respect to value, safety, nutritional value, and packaging.[1]

According to a study conducted in Ludhiana, as the income level goes on increasing, the percentage of people using packaged milk also goes on increasing, because they do not mind paying a little more for perceived better quality of the product. Ease and payment in delivery are the major reasons as told by consumers for buying unpackaged milk.[2]

According to a study in Turkey on consumer's perception and attitude toward packaged milk, the results state that communication tools and visual media available to the entire community are more effective than some factors such as the level of education and the level of income in determining attitudes toward products.[3]

According to a study conducted in Kenya on the role of pasteurized hawked milk in the transmission of brucellosis in Eldoret Municipality, the monthly reports from Trans Nzoia district veterinary office, the average case prevalence rate for bovine brucellosis was among the top ten cattle diseases with 8.5% prevalence. Consumption of raw or unpasteurized milk can be a source of human infection. In spite of its potential to transmit brucellosis, milk is one of the animal products consumed by many families, most of whom are not producers of the commodity, especially those residing in towns and urban centers. In this study, a majority of the households (77.5%) used unpasteurized milk sold by hawkers. According to local people's perception, brucellosis has become a disease of great public health concern in this

area, and its transmission is to a great extent linked to the consumption of hawked milk.[4]

Conclusion

Milk is being considered as a regular consumable item for every household and milk consumes by all the age groups irrespective of status. Most of the family preferred packaged milk over unpackaged milk. Community perceives good taste as traits of good quality milk followed by good smell, easily digestible, pearly white color, and economically cheap. Most of the packaged and unpackaged milk are available in the market are adulterant. They added urea, neutralizer, and detergent as an adulterant. Public health officials, FSSAI officials, and common people should work together to prevent adulteration. Food testing laboratories should be established at the local level for testing of the quality of milk. Pure, hygienic, and nonadulterant milk should be available for daily consumption to the public for a healthy life.

Limitations

This study was time and resource constraint. The results cannot be generalized to the whole community because of the smaller sample size and convenient sampling technique. Samples of unpackaged milk from the hawkers and local markets were not collected on the same day when milk samples were collected from households.

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Conflicts of interest

There are no conflicts of interest.

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